Annual Report 1983/1984

The Ontario Cancer Institute

500 Sherbourne Street
Toronto / Canada M4X 1K9
(416) 924-0671

23 August, 1984

The Honourable Keith Norton, Q.C.
Minister of Health,
10th floor, Hepburn Block,
80 Grosvenor Street,
Toronto, Ontario. M7A 2C4

Dear Sir:

It is again my pleasure to submit the Annual Report of The Ontario Cancer Institute incorporating The Princess Margaret Hospital for the year ended 31 March, 1984.

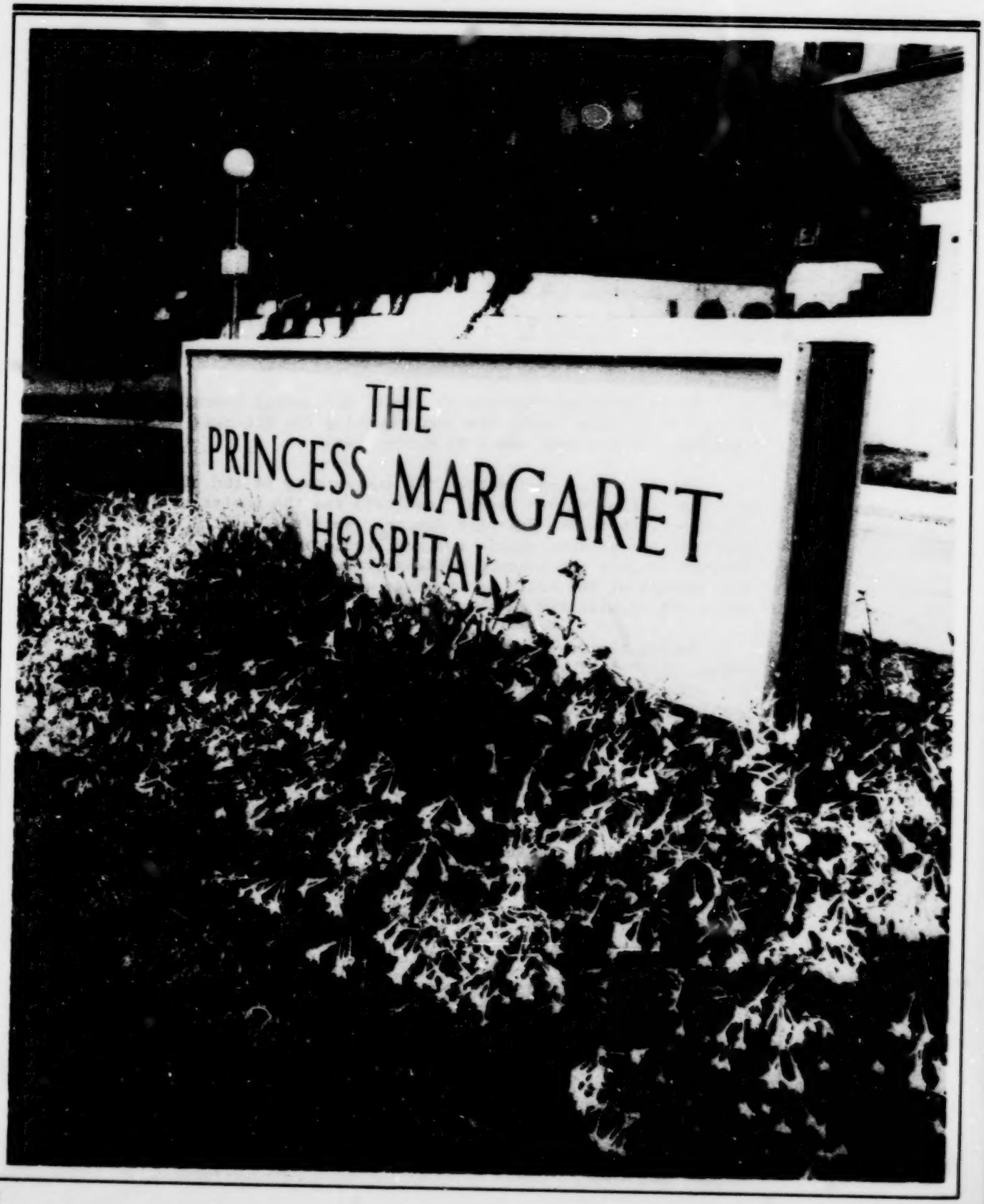
The past year marked the 25th anniversary of the official opening of The Ontario Cancer Institute and the admission of the first patient to The Princess Margaret Hospital. In recognition thereof, the general public and past patients of the Hospital were invited to join the current patients, the staff, the volunteers and the members of the Board in a number of special anniversary functions which are highlighted in this Report.

During the past year, the review of the Institute's long-range plans, to which I referred in the last Annual Report, culminated in the commissioning of a new Provincial Role Study. Among other things, the Role Study will be considering the current place of The Princess Margaret Hospital in cancer care and research in Ontario and its needs in the future. I am encouraged by the commitment that you gave to me that those needs will be met in a timely fashion as soon as they have been identified.

I would like to take this opportunity to express the appreciation of the members of the Board of the Institute to all persons connected with the Institute for their loyalty and devotion.

Yours sincerely,

R.W. Stevens
Chairman of the Board


THE
PRINCESS MARGARET
HOSPITAL

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1983-84

* New Appointment
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P. G. Tuffnell, M.D.
J. L. Yeoh, M.D.

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R. I. Mitchell, M.D.**
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M. Silberfeld, M.D.
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M. L. Soots, M.D.
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Douglas R. Wilson, M.D.
F. R. H. Wrigley, M.D.
A. Zipursky, M.D.
R. M. Zuker, M.D.

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Scientific Staff:
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A. Ciampi, Ph.D.
A. J. Cunningham, Ph.D.
R. M. Gorczynski, Ph.D.
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Physics

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F. P. Ottensmeyer, Ph.D.
A. M. Rauth, Ph.D.
A. J. Rawlinson, M.Sc.
W. B. Taylor, B.Eng.
J. Van Dyk, M.Sc.
H. P. Webb, C.E.T.
M. Yaffe, Ph.D.*

Administration

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Assistant Administrators:
T. Brazier
J. P. Holder
T. J. D. West
W. V. Wilkinson

Auxiliary of The Princess Margaret Hospital and Lodge

President:
Mrs. K. G. McVittie

The Year in Review

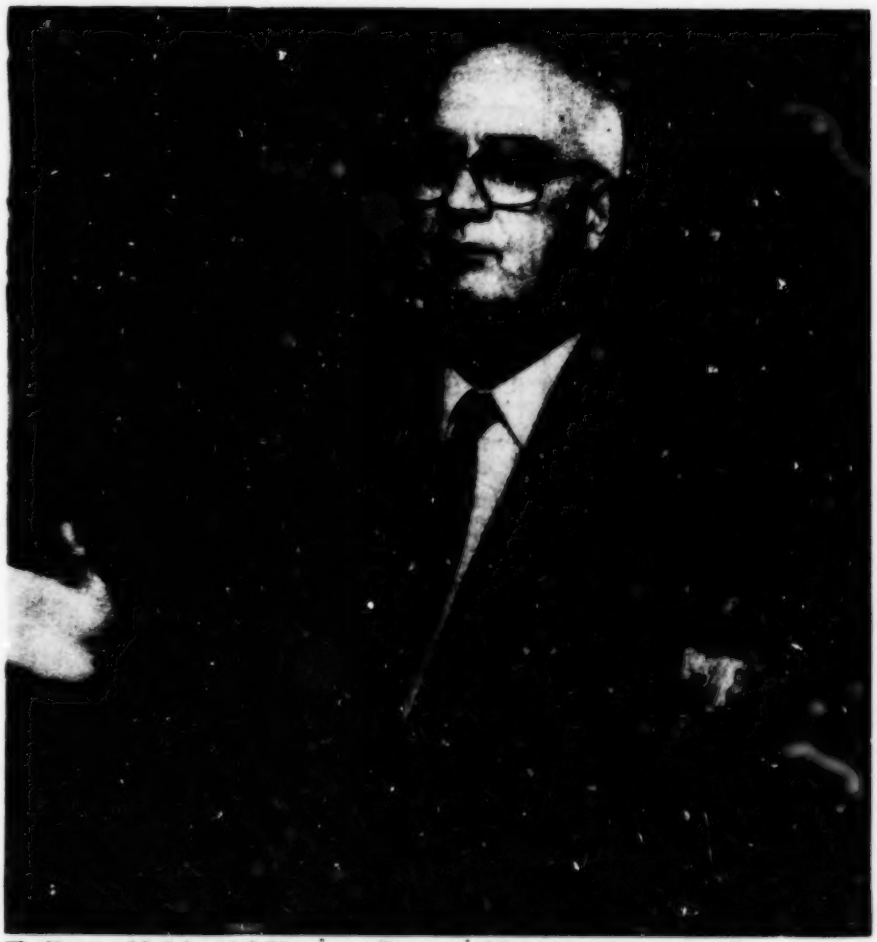
The past year was an important one for The Ontario Cancer Institute (OCI). It marked the 25th anniversary of an Institute which, right from its official opening and the admission of the first patient to The Princess Margaret Hospital (PMH) in 1958, has energetically pursued its mandate to develop an integrated organization with three components: hospital, research centre and educational resource.

Reaching the quarter century milestone was cause for celebrating the Institute's progress in all three facets of endeavour and for focussing on specific achievements. But, too, it was also a time for reflecting on a fundamental pattern that has emerged over the past twenty-five years. That pattern, it was discovered, is one of both change and consistency. There is really no paradox here for even as biological and physics research and clinical experience have provided the new knowledge, skills and technology to markedly enhance diagnostic capabilities and treatment modalities, certain cornerstone principles have remained unchanged. That is, from the very beginning, a key distinction has been made at the Institute — it isn't cancer that is being treated but ***patients*** who have cancer. It is a distinction that underlines the original concept of complete integration and the centre's holistic approach to patient care. It has been supported by an organizational structure that allows research facilities to be housed within the Hospital. Here there can be an ongoing interaction between researchers and clinicians that is conducive to broadened perspectives and new ideas. And what is equally important, there has been 25 years of daily interaction between staff in all areas and at all levels as well as between personnel and patients. This is manifested in a humanism translated by more than one long term patient as an enduring atmosphere of warmth and caring unmitigated by high technology.

It was, then, with a view to celebrating not only the three elements of patient care, research and education that special anniversary events were planned. There was also a concern for highlighting the ways in which evolution in these areas is, finally, a reflection of the Institute's determination to keep the spirit of 'caring for people' intact.

The OCI's teaching role was in the spotlight when graduates of the School of Radiotherapeutic Technology and the Medical and Radiation Oncology residency programs came from across Canada and around the world to attend reunions held in June. Social events were blended with a full program of lectures and a one-day research seminar hosted by the Department of Medical Biophysics.

June was very much a month for bringing people together. On June 17th, the Quarter Century Club was officially established when the Honourable John Aird, Lieutenant Governor of Ontario, joined members of the OCI board at a luncheon in honour of those staff and volunteers who have been with the Institute since 1958. In his remarks, the Lieutenant Governor emphasized the significant contribution made by Quarter Century Club members as people serving people. The commemorative program carried the names of the 43 founding members of the Quarter Century Club including 14 volunteers and 29 staff members representing virtually every aspect of the Institute. On Saturday, the 18th, approximately 180 registrants joined in the OCI/PMH Fun Run and set out

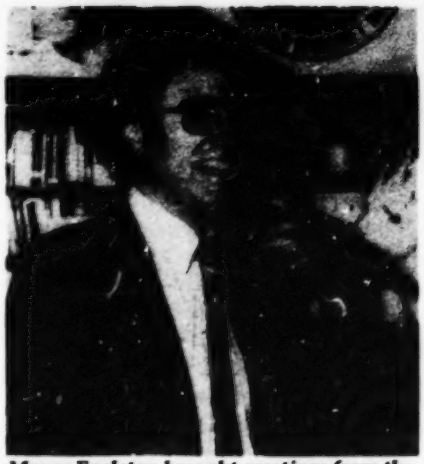


The Honourable John Aird, Lieutenant Governor of Ontario, commented on the contributions made by Quarter Century Club members.

to walk or run 2 kilometres and advertise the next day's Open House. Donning T-shirts with the new OCI/PMH logo, they warmed up with a professional fitness director and were urged to victory by Jan Tennant, the Global TV anchorwoman. Saturday's enthusiastic spirit carried over to Sunday and the main event. There was an excellent attendance at the Open House which provided a forum for illustrating the OCI's multi-faceted role, its multidisciplinary approach and its commitment to excellence in patient care. Comments made by Mayor Eggleton and by the Institute's Director, Dr. Raymond Bush, during the ceremonies that launched Open House emphasized the fact that it is the people who make the Institute what it is, and not least of all the patients. After receiving a formal salute from Dr. Bush, 45 of the patients who have been treated at the PMH for the past 25 years gathered at the Lodge for a reception in their honour.

Both the Lodge and the Hospital housed numerous exhibits and displays that provided both historical overviews and explanations of recent advances in research and patient services. Visitors to Open House were welcomed on tours that extended into all areas, from the Outpatient Clinic where displays and talks centred on trends in disease investigation and treatment to the Machine Shop, where they learned about the procedures involved in designing and building the Calitron, a device that carries radioactive pellets for the treatment of patients with cervical cancer.

Whether viewing leukemic cells through a powerful microscope at the bone marrow transplant display, manning the computer terminal at the quality of life display, or discovering the variety of imaging devices, the public took advantage of the opportunity Open House offered them to increase their knowledge of the Institute's research efforts. An overview of 1983/84 research highlights follows this summary.



Mayor Eggleton brought greetings from the City of Toronto.

A visitor to Open House views leukemic cells through a powerful microscope at the bone marrow transplant display.

Nursing's display showed the interaction necessary to give complete care to patients with ear, nose and throat cancer.

An important aspect of Open House was the chance it presented to put the spotlight on the contributions of staff in each of the many sectors of the OCI/PMH. Too, a variety of displays made evident not only the strengths and achievements of the different departments as single disciplines but the synergistic effects of continuing interdepartmental collaboration. Perhaps this dual perspective can best be illustrated by a closer look at the Nursing Department's Open House exhibit.

Over the past 25 years, the nursing staff has served a core function in the provision of outstanding patient care. So often the efforts of those involved in direct patient care seem to be taken for granted. Nurses' week, which was designated from May 1 - 7, had given time to pause and reflect on the unique contribution of the nurse, and in preparing the displays for Open House, it became evident that Nursing should best be presented both as a single discipline with its own special demands and as a model of the cooperation that is the expression of the Institute's holistic philosophy.

Pharmacy's exhibit on the historical development of chemotherapeutic agents, for example, illustrated the increasing demands that particularly face nursing staff members today. Only an unprecedently high degree of acute care skills allows nurses to competently assess and respond to the variety of subtle changes that can occur in the psychosocial and physical status of patients undergoing complex treatments.

On the other hand, the ways in which the nursing staff works in conjunction with the many support services at PMH was illustrated by two models. One showed the interaction

Care at The Princess Margaret Hospital includes dental services.

necessary to give complete care to ear, nose and throat (ENT) patients. Patients planned for treatment to this locale are initially assessed by the ENT support nurse and the dietitican. Present and anticipated problems are identified and a complete social, medical and nutritional history is created. Patients are then reviewed weekly or as required regarding their nutritional status. The referrals often come from the technical staff in Radiotherapy who are in daily contact with the patients. The Pharmacy, too, may be called upon to lend its expertise in the development of feeding regimens that meet all nutritional requirements.

A second model linked the services of the nursing staff with Psychological Medicine, the Social Services Department, the Home Care Coordinator and the Chaplaincy. Together they answer the many needs of patients — from spiritual support and crisis intervention to psychiatric counselling, from financial planning to on-going assistance after returning home.

The phrase "25 Years of Care and Research" which gave Open House its theme and gave momentum to all the celebratory anniversary events, maintains its significance when other highlights of 1983/84 are held in review.

Many people are suprised to learn that, today, 'Care' at The Princess Margaret Hospital includes dental services. The PMH dental clinic has offered general dentistry, oral surgery and prosthetics since December, 1982. During the year in review, the clinic operated two and one-half days each week and was staffed be a dentist/oral pathologist and a registered nurse. The steady increase in the number of patients seen in the last year, however, makes it reasonable to expect that it will become a fulltime clinic in the future with additional services and facilities.

A further expansion of patient services involved the completion of a patient information videotape on bone marrow transplantation (BMT) at The Princess Margaret Hospital entitled "You and Bone Marrow Transplants". The videotape proved a useful educational tool on Princess Margaret Day, January 26, 1984. BMT was the topic of the 13th Annual Educational Symposium for volunteers. Active volunteers, sustaining and life members of the Auxiliary, representatives of the Canadian Cancer Society and Region 6, Hospital Auxiliaries, all gathered to view the film and learn from the head of the PMH bone marrow transplantation team the reasons for transplants and their physical and psychological effects. Two volunteers spoke frankly of their personal experiences with BMT.

This special day for volunteers was an outstanding success, and it was so for a variety of reasons. The volunteers demonstrated their usual organizational skills and boundless energies; their unflagging desire to broaden their knowledge was evidenced by the excellent attendance; their warmth, openness, and breadth of experience made them not only keen students but invaluable educators. Indeed, the Symposium is just one example of the important place that volunteers have held at the PMH throughout the entire quarter century of its operation.

On any given weekday, one can count at least 45 volunteers under the direction of the Canadian Cancer Society Auxiliary on duty at the Hospital and Lodge. Indeed, recent statistics indicate that more than 55,000 hours of service were donated by some 340 volunteers in a single year. Such figures vividly convey the volunteers' indispensible contribution to patient care. Nor has this contribution gone unrecognized in the community. Members of the PMH volunteer team have been awarded honours by both the Ontario Medical Association and the Province for the role they have played in positively affecting the health and welfare of the people of Ontario.

Length of service records — at least a dozen volunteers have reached the 25 year mark — underline their commitment and their ability to provide remarkable continuity of service. The Auxiliary has been very successful in matching its effort to the growing and changing needs of the Hospital and Lodge. It is always responsive to new ideas and has conducted surveys to discover ways to increase the value of Volunteer Services to both patients and staff. For example, Assistance in Admitting was a volunteer service developed to help patients feel more relaxed by providing the company of a friendly, well-informed volunteer who remains with them in the busy admitting area and then acts as an escort.

From daily coffee and tea service in the Hospital to monthly Aperitif Hours at the Lodge, from diversional activity programs and entertainment to complimentary flower and library services, the volunteer role is multifaceted. The Auxiliary also operates two gift shops and donates all proceeds to the Trust funds for the Hospital and Lodge. It is these proceeds that have made possible, for example, much needed recent renovations to the lecture theatre.

Volunteers and, indeed, all staff members now share an added responsibility. In October, 1983, The Princess Margaret Hospital adopted more stringent guidelines for smoking. One of the first hospitals to establish such a policy, the PMH is encouraging staff and volunteers to ensure its effective implementation by wearing a No Smoking button and by asking anyone smoking in a No Smoking area to extinguish the cigarette. In general, smoking is quite simply discouraged. It is prohibited in all patient care and public areas with very few exceptions, most notably certain lounges.

In view of the current statistics and the fact that the prevalence of lung cancer is so marked, the adoption of the policy is considered very much a part of the Institute's role both as a centre for patient care and as an educational resource.

The 25th anniversary of the OCI/PMH also marked the beginning of a new Provincial Role Study.

Ten years ago, a Provincial Role Study was conducted by Kates, Peat, Marwick & Co. The recommendations from that study led to the Phase I expansion of the Hospital — the west wing vertical expansion. But the Phase II expansion, to have been implemented shortly after the opening of the Toronto Bayview Clinic at Sunnybrook Medical Centre, has been delayed because of a lack of commitment to funding by the Ministry of Health before the 1990s. Such a delay is not acceptable within the Institute's planning process since the staff are ex-

The volunteer role is multifaceted and includes a complimentary flower service.

periencing ever increasing difficulty in meeting the needs of patients, especially those referred to The Princess Margaret Hospital for radiotherapy.

During the past ten years many changes have also occurred. For example, chemotherapy has become a major form of treatment for patients with cancer, and the establishment of district health councils has had a major impact on health care planning. Therefore, it has become necessary to update the Provincial Role Study to provide continuity from the one completed in 1973.

At a time when technological advances are being made which involve significant costs, when specialized professional and technical personnel are moving to other centres or leaving the field, when there are financial constraints in an uncertain economy, and when the need for cancer research, diagnosis and treatment continues to grow, there must be improvements to the services for patients with cancer, and increased cost-effectiveness.

In order to study and improve these services, the OCI and the Ontario Cancer Treatment and Research Foundation (OCTRF) jointly commissioned a role study of the delivery of cancer services in the province.

Currie, Coopers & Lybrand (CCL) and Resources Management Consultants (RMC) formed a consortium to undertake the study which began in January, 1984 and is scheduled for completion by the end of the year.

The consultants are working with a Steering Committee composed of staff members of the OCI and OCTRF and a Planning Committee which includes members of the Steering Committee plus representatives of the Boards of the two organizations.

In addition, the consultants are interviewing many members of the staff, and seeking advice from an international panel of external experts.

The consultants' work plan has 16 tasks which include an examination and evaluation of alternative options for the organization of the OCI and OCTRF as well as suggestions for changes in patient services to prepare the Institute and Foundation for the future. The respective roles of the OCI and OCTRF in the coordination of regional cancer services and their relationship to other health care facilities are being examined along with their roles in cancer research and in professional education in the field of oncology. Too, a review is being made of the objectives and value of the Ontario cancer registry in monitoring and medical audit, to provide the information needed for assessment of its overall operation. Finally, CCL and RMC will address the cost implications of the resolution of issues arising out of this study.

There is every reason to believe that the insights derived form this major role study will help The Ontario Cancer Institute and The Princess Margaret Hospital embark on a second quarter century of care and research with a strengthened sense of direction and the tools and support essential to its successful pursuit.

Patients who had been treated at the PMH during the past 25 years gathered at the Lodge for a reception in their honour.

Clinical Highlights

One of the major objectives of the OCI is to ensure a safe environment for the staff who are having to work with potentially dangerous agents used for the treatment of patients. Radiation protection has always been a major component of our policies, and now these policies include the handling of chemotherapeutic agents. We also survey the staff in an effort to measure any exposure to toxic drugs, and based on these surveillance studies, we conclude that occupational exposure to toxic drugs is below detectable levels.

In measuring the effects of treatment it is necessary to measure changes before and after treatment. Although this would seem an easy task, in clinical practice it is not quite so straightforward. Clinical measurements can be subject to a surprising degree of error which can lead to inappropriate conclusions. The extent of this error has been measured, and stringent criteria established as a result so that the conclusions from our evaluation of the response to treatment will be more accurate.

A number of clinical studies have been completed, are continuing or have been initiated. These studies are all directed at trying to improve our knowledge about cancer and the treatments we use to help patients with the disease. They include the following. For patients with small localized cancers of the breast, removal of the lump itself rather than the whole breast is being practiced much more frequently. The question is whether radiation is required following lumpectomy to decrease any risk of recurrence in the breast. This is being studied within a Province-wide study in association with surgeons and the OCTRF centres. A number of studies are investigating the place of various chemotherapy regimens and hormones for patients with cancer of the breast. We have shown that a synthetic hormone, tamoxifen, is useful in decreasing recurrences in some women. Although many studies are directed at patients with breast cancer, in association with the Ludwig Institute, we also are studying ways in which we may prevent the disease. These studies are directed at patients known to have a high risk of developing cancer, and we are examining whether the attributes associated with that high risk can be changed to those associated with a low risk by the use of diet.

Thyroid cancer is not a common cancer. It was consequently a great advantage for one of the OCI staff to be responsible for the analysis of a trans-Canada study of thyroid cancer patients seen at cancer centres across the country. The analysis is still ongoing, but already has produced a wealth of information important for medical decision making and classifying the prognosis for patients. One type of thyroid cancer is very rare, is potentially detectable at the premalignant phase or when small and curable, and is hereditary. A screening clinic for relatives of known patients continues to be operated successfully.

For selected patients with large cancers on the mouth of the womb, the head and neck, and the oesophagus, studies are continuing in the examination of the usefulness of adding chemotherapy to the standard radiotherapeutic approach. There is no doubt that the response of the tumours is faster than with radiation alone, but it is still not clear whether survival is improved.

For patients with lung cancer, Toronto-based studies and those done in cooperation with the National Cancer Institute of Canada continue to try to find improved approaches to help patients with what is generally a dreadful disease because of the high risk of spread from the lung at the time of diagnosis. A variety of chemotherapy agents are being studied alone and in combination for the different types of lung cancer. Although excellent responses are obtained in one type of lung cancer, only a short extention of life is obtained and few are cured. Studies are also directed at classifying the type and place of surgery, and the dose and extent of radiation therapy.

Although there have been no major advances in the treatment of patients with malignant melanoma, it is clear that prevention can help, particularly for those who have previously had a superficial melanoma. The prognosis for such patients is excellent, but they do have an increased rate of developing a second primary melanoma. We have instituted a special sun screen counselling service in an effort to reduce this risk of developing a second skin cancer as exposure to ultraviolet light from the sun is a known risk factor.

There are two major types of cancer of the testes. For one type the outlook has been excellent (more than 90%) for many years with the use of surgery and post-operative radiation. For the other type only 50% survived until the introduction of combination chemotherapy. Now over 80% survive free of relapse. Consequently, for patients with either type of testes cancer, a major effort is now going into analyzing the patient and tumour attributes which may help us to individualize treatment for an optimal approach.

The treatment of patients with Hodgkin's disease is very successful with the vast majority cured of their disease. The clinical efforts are now directed at trying to establish optimal treatment for each patient. This requires even more detailed data collection than in the past, and the careful detailing of all treatment which is now within agreed upon policies. For patients with non-Hodgkin's Lymphoma, cure is not so easy to achieve although the quality of life is very much better from current treatments. We are trying to improve the individualization of treatment by examining patient and malignancy attributes to determine their importance. This includes "state of the art" characterization of the malignant cells by determining specific markers on the surface of the cells, and measurements on the rate of growth of these cells.

Collaborative studies with the Biological Research division have been ongoing for patients with myeloma and acute leukemia. Increasing evidence is accumulating that laboratory culture of either myeloma cells or leukemia cells can provide useful information in helping to decide on treatment. Bone marrow transplantation continues to be a useful approach for young adults who have gone into remission following their initial therapy for leukemia. Approximately one patient per week is being treated.

The support system for children who receive radiation therapy at The Princess Margaret Hospital has been improved over the past year. Specified radiation technologists only are committed to the treatment of children, and a liaison nurse helps to prepare the children and family before coming to the Hospital. The examination and waiting area in radiation therapy has been especially prepared with the young child in mind.

Studies to help clarify how best to alleviate the problems of nausea or vomiting following chemotherapy have been ongong. These studies have been done in collaboration with the National Cancer Institute of Canada (NCI(C), and improved approaches are being found.

Research Highlights

Research programs at the OCI are conducted by teams of scientists in two divisions, Biological Research and Physics, and at the interface of the research & clinical divisions by groups composed of medical, scientific and support staff.

The mission of the research divisions is to conduct a research program from fundamental to the applied but relevant to cancer. In this context, "fundamental" is defined as inquiry directed to increasing knowledge, regardless of whether the new insights are in basic cellular or molecular mechanisms, assessment of current managements or measurements of health status. Indeed contributors to the program are engaged in work in all of these areas. Research highlights during the past year may be noted in a number of areas.

Normal & Leukemic Haemopoiesis

Presently, the primitive cells capable of proliferating to give any of the many different cells in the bone marrow or blood can be detailed only in animal experiments. Yet studying the cell and genetic biology which is involved in the proliferation and specialization of these primitive cells is requisite for a better understanding of leukemia in man. Consequently, an important development has been the perfection of techniques for inserting human oncogenes into mouse blood-forming cells. The latter can be cultured with care and, hence, the effect of the human oncogene can be examined in great detail.

Experiments also have been ongoing with special mice unable to produce normal blood cells. Many of these mice develop malignancies of the thymus gland, a gland involved in the development of one class of white blood cells. It is hoped that these studies will produce clues about the precise genetic defect at work and so make possible a better understanding of thymic cancers.

It is notable that the results of laboratory studies over this past year support the view that gene expression in acute myeloblastic leukemia (AML) is abnormal. Not only have primitive leukemic cells been shown to have characteristics associated with more than one of the different cell types in the bone marrow, but some of these human leukemic cells have a marked variation in the ability to renew themselves. The suggestion is that DNA coding specifically for self-renewal may exist. These findings suggest that, in the future, therapy may be more effective if targeted specifically to mechanisms involved in self-renewal.

Immunology

A breakthrough discovery in immunology at the OCI laboratories has generated international excitement in the scientific community.

Many different cell types are involved in an immune response but one of the most important is matured in the thymus and is called a T-cell. Each T-cell recognizes only one antigen and it has been proposed that the "T-cell receptor" is responsible for this recognition. But in the past, genes coding for this receptor had not been isolated.

This last year, studies led to the recognition and characterization of that very gene which specifies that a cell will be a T-cell in humans. Now the opportunity exists to develop methods for being able to recognize such cells,

At a news conference in March, Dr. Tak Mak outlined how his research team had succeeded in isolating a piece of DNA that codes for information essential for many immune reactions.

and studies are ongoing to analyse the functions of the gene in different types of T-cells.

The results of these investigations will provide a great deal of information about the immune system both in relation to malignancies and to many other diseases.

One area of study, for instance, has yielded preliminary results indicating that T-cells produced from one original T-cell with known specificities to the recognition of self or non-self can change with time depending on the environment. Thus T-cell specificity is not stable as was once thought. Since it is now known that a part of the environment which is important is the presence of another type of blood white cell classified as a stimulator cell, future work can be aimed at what characterizes the "stimulator cells" and how they interact with other cells to maintain the recognition of self.

Tumour Biology and Experimental Therapy

It has been known for some time that the fundamental structure of the chromosomes in a cell (DNA) can be damaged by a variety of agents, some of which can cause cancer through their damaging effects. Frequently such damage is repaired, and this was believed to be due to chromosomes usually having one gene dedicated to such repair. Nevertheless, this was only a theory and the precise mechanism of repair is not known. In the past year an exciting advance resulted from the isolation of a human repair gene at the OCI and the theory was confirmed. Work is now ongoing to obtain large quantities of this gene so that its mechanism of action can be studied, and consequently to determine whether such knowledge can be used in the future to help prevent the development of cancers.

The past year also marked new advances in the understanding of retinoblastoma, a malignancy of the eye which occurs in young children. That retinoblastoma can be inherited has long been known, and ten years ago it was discovered that the inheritance is due to a mutation on chromosome number 13. However, it has also been clear for many years that a second mutation must also occur before a tumour can develop. Studies now have shown that the second, acquired change involved the second but normal chromosome 13. It is understood that an individual inherits one mutated chromosome from a parent with retinoblastoma and one normal chromosome. If during cell division, the cell is left with two copies of the mutated chromosome, a tumour develops. Studies have now been directed at investigating ways to control the malignant change.

In the area of experimental therapy, researchers continue to probe the interaction of chemotherapeutic drugs and radiation and are studying, for example, certain classes of drugs which can mimic oxygen. The goal is to increase the effectiveness of radiation on tissues which have a low oxygen level such as some cancers.

Investigations also are continuing into the reasons for both drug resistance and matastases through the close observation of mutations that can be identified by certain proteins which are produced and can be measured. Even if the mechanism of resistance isn't clarified, these methods should help in clinical management.

Imaging

A new ultrasound breast scanner, using a special transducer (ultrasound transmitted receiver), invented and developed at the OCI, provides more detailed images of the breast than has been possible with ultrasound in the past. Initial testing of the scanner included detailed comparisons of ul-

Dr. Peter Ottensmeyer has developed an improved electron microscope.

trasound and x-ray mammography in the detection of both benign and malignant breast disease.

Both fundamental and clinical research programs in magnetic resonance imaging (MRI) have been pursued throughout the past year. In the fundamental studies, the variables that can influence the image of an object have been examined in detail and this has allowed marked improvement to be made to the OCI's prototype clinical machine. Evaluation of the role of this new modality was initiated and more than 600 patients and volunteers were scanned during the first year of operation. In the coming year, the major protocols investigating the diagnostic accuracy of MRI will be completed.

The OCI development of an improved electron microscope has allowed an increase of 10 billion times over what can be achieved from standard x-ray analysis. By no other method can such magnification be achieved for viewing structures so small that they are invisible even under a standard electron microscope. Still further improvements have been underway. The uniqueness of the equipment has resulted in collaborative studies in many fields and with international groups as far away as Israel and Japan.

Clinical Physics

Research activities in clinical physics continue to be directed to the goal of practical improvement in the physical and technical aspects of radiation therapy; these involve projects in radiation dose measurement, improvement of radiation beams for therapy and the development of dose calculation methods for treatment planning.

For instance, because the beam characteristics of linear accelerators are prone to fluctuations leading to potential uncertainties in the delivery of dose to the patient, OCI physicists have designed a new matrix dosemeter. The design, which allows a rapid yet complete evaluation of the beam from any linac, is especially useful for the current generation of high energy linacs whose electron scanning systems make the use of conventional dosemeters difficult. The manufacture of 6 new units began last year, some for use on OCI linacs and others for use by the OCTRF clinics and Atomic Energy of Canada Limited.

Through the application of computerized tomography (CT), the response of various tissues to irradiation can be studied in detail. In the past year, a special area of interest has been the thorax since it contains the lungs whose low density makes them more sensitive to irradiation than many other tissues. The objective of these studies and others like them is the control of dosages so that they are both adequate and exactly localized, striking diseased areas but minimally affecting healthy tissues to avoid the risk of complications.

Biostatistics and Health Status

Quality of life studies have progressed in the past year. It had been recognized that a new treatment may not *prolong* survival compared to previous treatments but may improve the *quality* of that survival — an admittedly difficult, subjective concept to approach. Still, if progress was to be made in clarifying the consequences of therapeutic choices, evaluation of the impact of both disease and treatment on the patient's general health was essential. In turn, careful attention had to be given to the differing values that patients put on the various components of health. Now, through the ongoing accumulation of data, some systematic shifts in these values have come to light which may be a reflection of fundamental attitudes toward death and the perceived quality of life. Thus, explorations of the basis of such shifts may provide more universal clues as to how best to deal with situations where alternative therapies may involve tradeoffs between quantity of life and different aspect of quality of life.

Education Report

Medical Education

Undergraduate Medical Education

As detailed in last year's report, PMH staff members are concerned about the lack of formal arrangements to ensure that undergraduate medical students are exposed to patients suffering from malignant disease, particularly in the earlier stages when treatment is likely to be curative. The Faculty of Medicine's Curriculum Renewal Committee has submitted its recommendations for changes in the undergraduate curriculum; unfortunately, these recommendations do not include specific changes in the teaching of oncology. One of the Committee's recommendations is the establishment of "core" selectives which will be more highly structured than selectives have been in the past, but each will be available to only a small number of students. In 1984-1985, these new selectives will be available only to first year students. We have submitted a proposal for a core selective in which students would interview cancer patients to determine the influence of life style on the development of cancer and, conversely, the impact of the diagnosis of cancer on the patient's life style. This selective will be available to only a small number of students.

In 1983-1984, there were 19 undergraduate medical students who took electives or selectives at The Princess Margaret Hospital. Eleven were from the University of Toronto, five were from other Canadian universities and three were from United Kingdom universities.

Postgraduate Medical Education

The University of Toronto continues to be the leading Canadian centre for the training of Radiation Oncologists and Medical Oncologists. Of the 66 successful candidates at The Royal College of Physicians and Surgeons of Canada's examinations in Radiation Oncology between 1972 and 1983, 36 (55%) undertook all (29) or part (7) of their specialty training at The Princess Margaret Hospital. As the first specialty examinations in Medical Oncology will be held in 1985, no comparable figures are available. However, throughout most of the past decade, the University of Toronto provided the only structured program in Medical Oncology training in Canada.

In 1983-1984, there were 21 residents and fellows in Radiation Oncology, 18 residents and fellows in medical Oncology, seven residents and fellows in Pathology, and one resident in Nuclear Medicine. Five University of Toronto Family Practice trainees and three residents from other specialty programs at Toronto spent electives in Radiation Oncology along with eight residents from four other programs — McMaster University, University of Western Ontario, University of Ottawa and the University of Alberta. One resident from McMaster Universtiy and five residents from the University of Toronto programs spent electives in Medical Oncology.

In 1983, four Clinical Oncology trainees were successful at The Royal College specialty examinations in Internal Medicine, five in Radiation Oncology and two at the American Board examinations in Radiation Oncology.

Medical Biophysics

The Department of Medical Biophysics continues to meet its objective and to produce independent investigators in the areas of Cell Biology, Genetics, and Medical Physics. Although the Department is based at The Ontario Cancer Institute, there are large and expanding groups of faculty at both the main campus of the University of Toronto and at the Hospital for Sick Children. At the present time, there is a faculty of 30 at The Ontario Cancer Institute, 14 at the University of Toronto, and nine at the Hospital for Sick Children.

Recent years have seen a marked increase in our graduate training program, particularly in the areas of molecular genetics and medical physics. The renewed interest of undergraduates has led to an increase of applicants and a subsequent increase in the number and quality of graduate students. One indication of the high quality of our students is that 75% (58/79) have received competitive scholarships to support their graduate studies. During the past year, there were 31 students in the Cell Biology Program, 13 in Medical Physics, and 35 in Genetics.

In 1983 ten students received their Ph.D. degrees and one an M.Sc. degree. These graduates all obtained excellent academic or industrial positions. Six graduates chose to continue their education as postdoctoral fellows in another institution. Of these, three are studying in the United States, one in Canada and two overseas. Three students took permanent jobs, all in Canada; and one went to Medical School. The M.Sc. graduate entered a Ph.D. program in the Department.

School of Radiotherapeutic Technology

During the past year, seven students graduated from the School of Radiotherapeutic Technology. All were successful in finding positions and are working within The Princess Margaret Hospital (PMH) or in one of The Ontario Cancer Treatment and Research Foundation (OCTRF) clinics. There are currently 15 students enrolled in the program and a further 25 from affiliated clinics in Nova Scotia are attending the didactic lectures.

Another successful in-service education program was organized for the graduate radiation therapy technologists during late 1983/early 1984 which was also attended by the Staff of nearby OCTRF clinics. It is anticipated that the requirement for continuing education and up-grading courses will increase significantly over the next two to five years as the number of new job openings becomes stabilized.

It is interesting to note that a recent survey of Canadian radiotherapy centres indicates that there are 238 technologists presently employed in the English speaking centres. More than 30% of this work force is composed of graduates from The Princess Margaret Hospital School. In addition, a further 11 PMH graduates are still employed in radiotherapy outside Canada and five are working in the allied disciplines of radiology or nuclear medicine. Overall approximately 72% of the 117 students who have graduated from the PMH School of Radiotherapeutic Technology since its inception have continued to work within the field. These figures do not include those students from other clinics who have received their didactic training at The Princess Margaret Hospital.

Miss Joan Beaverstock, Teaching Supervisor, works with students in the School of Radiotherapeutic Technology.

Nursing

Educational activities of the Nursing Department continue to include student, staff and visitor programs.

Ninety students from community college nursing programs joined the Hospital for three days' clinical experience. Others spent shorter periods of time touring the facilities and learning about oncology nursing. There were 12 participating undergraduate students and one graduate student from the University of Toronto as well as an undergraduate student from the University of Ottawa.

The visitor program attracted professionals from across Canada, and from England, Australia and Saudi-Arabia. Visits were usually of one day or two days' duration but in 1983/84 a number of visitors stayed a week or longer. Nursing staff again found the mutual exchange of information rewarding.

Through the cooperative efforts of certified nurse instructors in Nursing and Radiotherapy, 18 courses were offered in Basic Life Support and 154 staff were certified or recertified.

In addition to providing these programs, the Department focussed on developing self-learning packages. Two particularly successful completions were The Certification program for Cancer Chemotherapy Administration, which has been purchased by other institutions and the Management and Care of the Patient, a package that contains a video component.

Another educational approach in the past year was the utilization of resources from community colleges for on-site programs. Training grants allow the Institute to share in these programs at a reduced cost.

Statistics

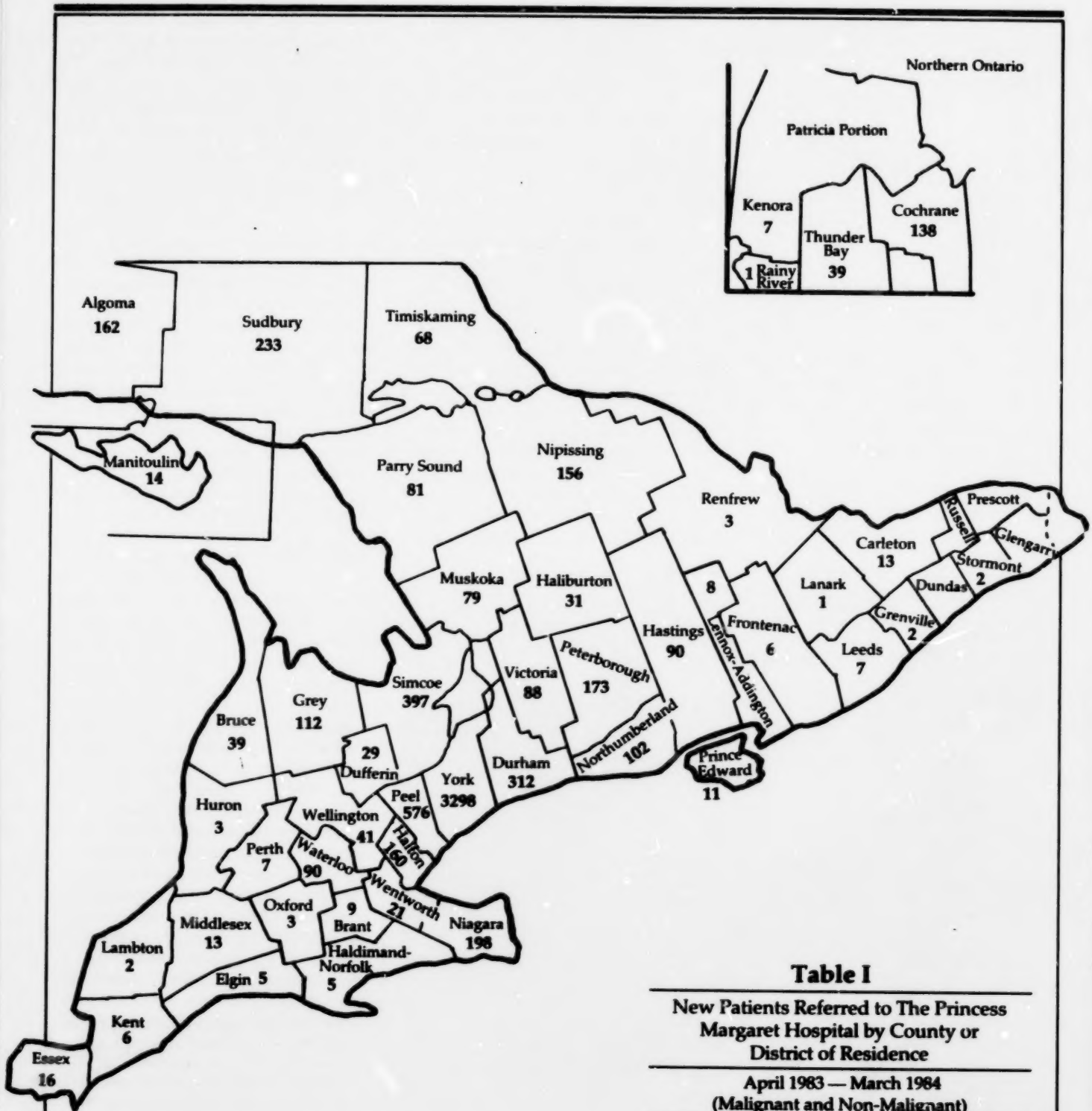


Table I

New Patients Referred to The Princess Margaret Hospital by County or District of Residence

April 1983 — March 1984
(Malignant and Non-Malignant)

Total Ontario	6857
Total Outside Ontario	134
Total Outside Canada	77
Total	**7068**

Table II

New Patients with Malignant Disease Distribution by Age and Sex

April 1983 — March 1984

Age	*Male*	*Female*	*Total*
Under 1	4	10	14
1-4	25	12	37
5-9	19	18	37
10-14	10	13	23
15-19	39	21	60
20-29	123	107	230
30-39	148	271	419
40-49	240	452	692
50-59	637	784	1421
60-69	938	833	1771
70-79	745	619	1364
80-89	196	247	443
90-99	13	31	44
Total	**3137**	**3418**	**6555**

Table III

Cases of Malignant Disease Distribution by Site of Malignancy

April 1983 — March 1984

Site	*Male*	*Female*	*Total*
Lip	19	6	25
Tongue	50	18	68
Rest of Mouth	73	50	123
Pharynx & Tonsil	86	39	125
Oesophagus	54	22	76
Stomach	59	31	90
Intestine - except rectum	101	105	206
Rectum & anal canal	184	131	315
Other digestive system	40	41	81
Nose, middle ear & Acc. sinus	17	11	28
Larynx	149	34	183
Lung, bronchus & trachea	796	337	1133
Other respiratory system	13	2	15
Bone	12	7	19
Connective & other soft tissue	28	31	59
Malignant melanoma (skin)	76	81	157
Other cancer of the skin	334	280	614
Breast	3	1115	1118
Cervix uteri	0	243	243
Other uterus	0	217	217
Ovary, tubes & ligament	0	207	207
Other female genital organs	0	32	32
Prostate	301	0	301
Other male genital organs	99	0	99
Bladder	153	40	193
Kidney, ureter & urethra	50	38	88
Brain & nervous system	103	70	173
Thyroid gland	13	29	42
Secondary carcinoma	109	103	212
Hodgkin's Disease	75	43	118
Other lymphomas	151	147	298
Leukemia	91	77	168
Other sites	93	78	171
Total malignant cases:	3332	3665	6997 *
Cases of non-malignant disease	189	348	537 +
Total	**3521**	**4013**	**7534**

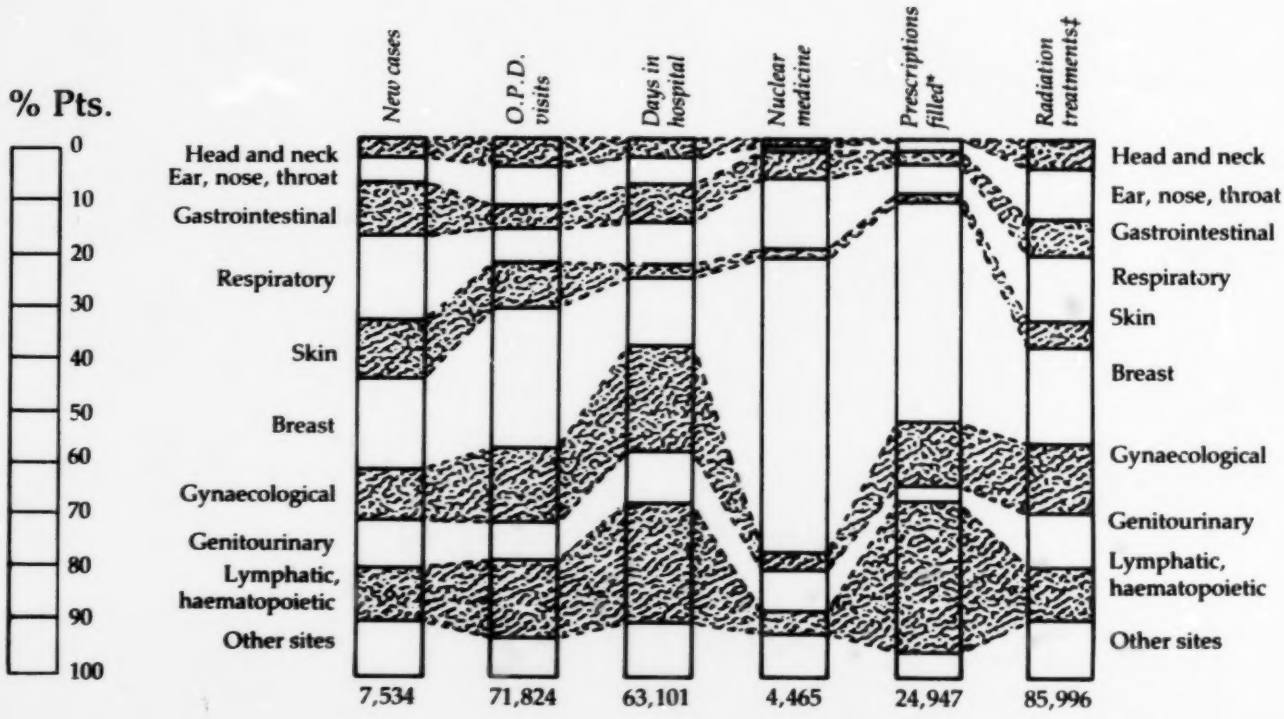
* *Number of malignant cases differs from number of new patients with malignant disease because this table includes multiple entries for patients having more than one malignancy during the specified time period, as well as new malignancies in patients registered previously.*

\+ *Includes cases seen in the diagnostic breast clinic and the medullary thyroid carcinoma screening clinic.*

Table IV

Hospital Workload by Site of Disease

(Percentage of Workload)
April 1983 — March 1984



*Chemotherapy only

‡External beam only

Table V

Number of Treatments Given in the Department of Radiotherapy

April 1983 — March 1984

External Beam	
Superficial x-ray	1,670
Deep x-ray	3,574
Cobalt	43,417
Linear accelerators:	
Low energy	6,376
High energy	25,933
Betatron	5,026
Total	**85,996**
Inpatient treatments	17,419
Outpatient treatments	68,577
Total	**85,996**

Sealed Sources	
Intracavitary	290
Interstitial (needles, wires & seeds)	33
Strontium applicators	122
Total	**445**

Table VI

Services at Peripheral Clinics

April 1983 — March 1984

	New Patients Seen		*Peripheral Clinic Visits**	
Clinic	*Malignant*	*Other*	*Malignant*	*Other*
North Bay	125	10	1291	48
Owen Sound	71	4	713	19
Peterborough	39	2	1765	32
Sault Ste Marie	65	3	785	19
Sudbury	23	1	1204	16
Timmins	41	11	1012	39
Total	**364**	**31**	**6770**	**173**

* *Including the visits when patients are first seen at peripheral clinics, as well as subsequent visits for new and old patients.*

Table VII

Paediatric Cases Under 17 Years of Age

April 1983 — March 1984

Leukemia	31
Lymphomas:	
Hodgkin's Disease	4
Non-Hodgkin's Lymphoma	2
Bone Tumours:	
Osteosarcoma	1
Other	2
Sarcomas:	
Rhabdomyosarcoma	6
Other sarcomas	4
C.N.S.:	
Medulloblastoma	10
Ependymoma	3
Astrocytoma	5
Other gliomata	5
Other C.N.S. tumours	7
Neuroblastoma	15
Nephroblastoma	10
Retinoblastoma	5
Other Malignant Neoplasms	13
Benign and non-neoplastic lesions	25
Total	**148**

Acknowledgements

The operations of The Princess Margaret Hospital, which is incorporated in The Ontario Cancer Institute, are financed similarly to those of other public hospitals in Ontario, with the exception that, as a radiotherapeutic centre, additional funds are received from The Ontario Cancer Treatment and Research Foundation.

Basic support for the clinical and fundamental research carried out at The Ontario Cancer Institute is provided by The Ontario Cancer Treatment and Research Foundation and the Province of Ontario. In addition, research grants, contracts, fellowships and scholarships from the following sources have provided the further support necessary for research programs:

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Janssen Pharmaceutica Inc.
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McGill University
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Ministry of Colleges & Universities
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— Ivan H. Smith Memorial Studentships
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University of Toronto
The Upjohn Company of Canada
Warner Lambert Ltd.
World Health Organization

Also, our research and clinical activities are assisted by bequests and donations. In particular we wish to acknowledge the following bequests and donations:

Bequests from the estates of the late:

Elmer Aitken
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Milton Dinsmore
Catherine Edmonds
Leon V. Goldberg
Greta Hutley
Margaret Innes
Frances E. Johnson
Edward E. McAlister
Jean McKenzie
John W. R. C. Moore
Anne C. Robertson
Myrtle E. Rous
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Grace Bates
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Judith Anne Williams
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Mr. John Bergsma
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DelZotto, Zorzi, Applebaum
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Mr. & Mrs. G. E. Rutherford
Mr. & Mrs. Michael Ryan
The Salder Foundation
Colonel Sanders Charitable Organization
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Mr. Karl Wildi
Ms. Katherine Williams
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Bush RS. *Arthur W. Erskine Lecturer*, Radiological Society of North America, Chicago. November, 1983.

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Henkelman RM. *Prix Origene Dufresne On Advanced Medical Imaging*. Canadian Association of Radiologists. June, 1983.

Kroll BA. *1984 Searle Award for Sunscreen Counselling Program for Melanoma Patients*.

Tannock IF. *COSA visitor*. Principal invited guest of the Clinical Oncology Society of Australia, November 30 — December 2, 1983.

Auditors' Report & Financial Statements
The Ontario Cancer Institute

To the Members of
The Ontario Cancer Institute:

We have examined the balance sheet of The Ontario Cancer Institute as at March 31, 1984 and the statements of operations, fund balance and changes in financial position of the integrated fund and the statement of endowment and special purposes fund for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion, these financial statements present fairly the financial position of the Institute as at March 31, 1984 and the results of its operations and the changes in its financial position for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Clarkson Gordon

Toronto, Canada
June 1, 1984 Chartered Accountants

Balance Sheet
MARCH 31, 1984
(with comparative figures at March 31, 1983)

ASSETS	1984	1983
Integrated Fund		
Current:		
Cash	$ 3,182,937	$ 624,733
Short-term investments, at cost including accrued interest (which is equivalent to market)	352,553	2,564,411
Accounts receivable —		
Patients' accounts	1,088,878	641,065
Ontario Ministry of Health	1,982,741	1,946,416
The Ontario Cancer Treatment and Research Foundation	797,023	422,615
Research grants		83,396
Other	957,341	793,906
Due from the endowment and special purposes fund		37,509
Due from P.M.H. Trust	71,773	
Inventories, at cost	665,258	637,774
Prepaid expenses	108,597	110,488
Total current assets	9,207,101	7,862,313
Property, at cost:		
Land	3,033,365	3,033,365
Building	18,979,747	18,913,045
Equipment and furniture	20,238,270	18,267,770
	42,251,382	40,214,180
Less accumulated depreciation	18,873,482	17,166,610
	23,377,900	23,047,570
Construction in progress	593,033	369,160
	23,970,933	23,416,730
	$33,178,034	**$31,279,043**

Endowment and Special Purposes Fund

Cash		$ 53,176
Investments, at cost plus accrued interest (market value 1983 — $10,984,542)		10,938,682
		$10,991,858
Total assets	**$33,178,034**	**$42,270,901**

On behalf of the Board:

Member
Member

(See accompanying notes)

LIABILITIES AND FUND BALANCES	1984	1983
Integrated Fund		
Current:		
Accounts payable and accrued liabilities	$ 5,407,455	$ 5,684,997
Research grants received in advance	195,919	
Total current liabilities	5,603,374	5,684,997
Fund balance	27,574,660	25,594,046
	$33,178,034	$31,279,043
Endowment and Special Purposes Fund		
Due to the integrated fund		$ 37,509
Fund balance		10,954,349
		$10,991,858
Total liabilities and fund balances	$33,178,034	$42,270,901

Integrated Fund Statement of Operations

FOR THE YEAR ENDED MARCH 31, 1984
(with comparative figures for the year ended March 31, 1983)

	1984	1983
Revenue for patient care, research and education:		
Ontario Ministry of Health and others for patient services	$37,796,520	$34,226,426
The Ontario Cancer Treatment and Research Foundation	4,098,837	4,273,854
Other granting agencies	6,019,698	5,582,035
Sundry	2,547,541	1,709,880
	50,462,596	45,792,195
Expenses for patient care, research and education:		
Salaries and wages	32,815,486	29,890,672
Supplies and other operating expenses	16,212,997	15,030,750
	49,028,483	44,921,422
Excess of revenue over expenses before depreciation	1,434,113	870,773
Depreciation of buildings	474,067	473,267
Depreciation of equipment and furniture	1,232,805	1,278,988
	1,706,872	1,752,255
Excess of expenses over revenue for the year	$ 272,759	$ 881,482

(See accompanying notes)

Integrated Fund Statement of Fund Balance

FOR THE YEAR ENDED MARCH 31, 1984
(with comparative figures for the year ended March 31, 1983)

	1984	1983
Balance, beginning of year	$25,594,046	$23,508,987
Deduct excess of expenses over revenue for the year	272,759	881,482
	25,321,287	22,627,505
Add grants for building alterations and equipment—		
Ontario Ministry of Health	1,408,597	1,270,083
The Ontario Cancer Treatment and Research Foundation	313,584	1,428,818
P.M.H. Trust	310,579	
Transfer from endowment and special purposes fund		110,923
Other	220,613	156,717
	2,253,373	2,966,541
Balance, end of year	$27,574,660	$25,594,046

(See accompanying notes)

Integrated Fund Statement of Changes in Financial Position

FOR THE YEAR ENDED MARCH 31, 1984
(with comparative figures for the year ended March 31, 1983)

	1984	1983
Sources of funds:		
From operations—		
Excess of expenses over revenue for the year	$ (272,759)	$ (881,482)
Add depreciation not requiring an outlay of funds in the current year	1,706,872	1,752,255
	1,434,113	870,773
Grants for building alterations and equipment	2,253,373	2,966,541
Proceeds on disposal of fixed assets		1,570
	3,687,486	3,838,884
Application of funds:		
Fixed asset acquisitions	2,261,075	2,868,473
Increase in working capital	1,426,411	970,411
Working capital, beginning of year	2,177,316	1,206,905
Working capital, end of year	**$3,603,727**	**$2,177,316**
Represented by:		
Current assets	$9,207,101	$7,862,313
Current liabilities	5,603,374	5,684,997
	$3,603,727	**$2,177,316**

(See accompanying notes)

Statement of Endowment and Special Purposes Fund

FOR THE YEAR ENDED MARCH 31, 1984
(with comparative figures for the year ended March 31, 1983)

	1984	1983
Balance, beginning of year	$10,954,349	$9,331,676
Bequests and donations received	156,268	523,147
Investment income	280,194	1,179,215
Other income	11,475	55,802
Disbursements	(18,284)	(24,568)
Transfer to P.M.H. Trust (note 2)	(11,384,002)	
Transfer to integrated fund		(110,923)
	(10,954,349)	1,622,673
Balance, end of year	**Nil**	**$10,954,349**

(See accompanying notes)

Notes to Financial Statements
MARCH 31, 1984

1. Summary of significant accounting policies

(a) Basis of Ministry of Health funding —

Pursuant to the Health Insurance Act the Institute receives funds from the Ministry of Health to substantially cover its operating costs. Funds are received during the year based on a total amount approved by the Ministry prior to the commencement of the fiscal year. Any surplus or deficit arising from the difference between the Institute's actual operating results for the year and the amount approved by the Ministry is retained or financed by the Institute.

(b) Depreciation --

Although substantially all fixed assets acquired by the Institute are financed by the Ministry of Health and The Ontario Cancer Treatment and Research Foundation, the cost of such assets is recorded in these financial statements and depreciated on a straight line basis at the following rates:

Buildings — 2½%
Major equipment — 5%, 6.6%, 10% or 20%

2. Transfer of endowment and special purposes fund

On June 30, 1983, the Institute transfered $11,384,002 being all of the assets net of liabilities of the endowment and special purposes fund to the P.M.H. Trust, a newly created charitable foundation, whose objects are to receive and maintain funds to be applied from time to time for the benefit of the Institute. Since the P.M.H. Trust is separately incorporated with its own Board of Directors, its financial statements are not included with those of the Institute.

3. Tax Status

The Ontario Cancer Institute is registered as a charitable organization under the Income Tax Act (Canada) and is therefore exempt from income tax and may issue tax deductible receipts to donors.

4. Commitments

The Institute in 1982 entered into an agreement to purchase radiotherapy equipment for an amount of $1,225,533 of which $367,660 had been spent to March 31, 1984. The balance will be paid next year.

5. Pension plan

The Institute has a voluntary pension plan for its employees. Based on the most recent actuarial valuation of the plan as at July 1, 1983, there is no unfounded liability.